**University of Leicester**

**MIBTP studentship project 2026**

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| **First Supervisor** | Dr Hollie Marshall |
| **School/Department** | Division of Genetics and Genome Biology |
| **Email**  | hjm32@leicester.ac.uk <https://mooholl.github.io/>  |

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| **Second Supervisor** | Professor Luisa Orsini |
| **School/Department** | School of Biosciences, University of Birmingham |
| **Email**  | l.orsini@bham.ac.uk  |

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| **Additional Supervisor** |  |

**Section 2 – *Project Information***

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| **Project Title** | Using resurrected crustaceans to understand how ancestral exposure to pollution affects epigenetic biomarkers of transgenerational health. |
| **Project Summary**  |
| Environmental insults such as pollution can cause transgenerational negativehealth outcomes in both wild animal populations and humans. These outcomescan be mediated by epigenetic changes, such as DNA methylation. However,transgenerational epigenetic inheritance is difficult to study in mammals due tolong generation times and need for ethical practices. We therefore use NewApproach Methodologies, such as responsive invertebrates, to identify themechanisms underpinning transgenerational health outcomes.A powerful species used to understand transgenerational epigenetics is Daphniamagna. Daphnia are freshwater crustaceans which can be resurrected fromdormant life stages obtained from sediment cores. This PhD will use Daphniaresurrected from two temporal populations: ~1980s when the lake had highpollution and the late ~1800s when pollution was lower. These populations willallow us to test how ancestral exposure effects epigenetic responses to modernday pollution.Aim 1: determine if pollution-induced DNA methylation changes can act asbiomarkers, predicting the health of future generations.Aim 2: determine if these DNA methylation changes are dependent on ancestralexposure, i.e. genetically mediated through evolutionary processes.You will be trained in:-ecotoxicology to carry out chemical exposures, measuring fitness (fecundity,growth, development time) across multiple generations-the full pipeline of Nanopore Sequencing (extractions, library preparation,sequencing, bioinformatic analysis)-machine learning to integrate DNA methylation and phenotypic dataThe last component of your project is dependent on your interests; you caneither pursue further machine learning models, attempt CRISPR/Cas9 DNAmethylation editing to see if epigenetic changes play a causative role inphenotypic outcomes, validate your biomarkers by resurrecting a new historicalpopulation or carry out fieldwork to test your biomarkers in modernpopulations.Techniques that will be undertaken during the project- Ecotoxicology using New Approach Methodologies (Daphnia magna)- Molecular biology: DNA/RNA extraction etc.- Nanopore sequencing- Bioinformatic analysis (R / Bash / Python / Machine Learning) |
| **References** |
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